



MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations for 2015/2016 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

FIRST SEMESTER EXAMINATION FOR DIPLOMA IN EDUCATION

SBT 0201: GENERAL GENETICS

DATE: 3/8/2016

TIME: 2.00-4.00 PM

Instructions:

Answer question 1 in section A (COMPULSORY) and select 2 questions in section B

SECTION A

QUESTION ONE

- a) Outline the relationship between genotypic and phenotypic characteristics (4 marks)
- b) Differentiate, with the aid of diagrams, between mitotic Metaphase and Metaphase 1 (4 marks)
- c) State the site and significance of mitosis in organisms (3 marks)
- d) Define a nucleotide and draw a labeled sketch of its structure (4 marks)
- e) State, with examples, the difference between genic and chromosome diseases (4 marks)
- f) Describe somatic and germline mutations and state their effect in organisms (4 marks)
- g) Explain how the environment affects the extent of expression of the genotype (4 marks)
- h) Define hybrid and distinguish a monohybrid from a dihybrid cross (3 marks)

SECTION B

2. a) Outline the process of meiosis and specify the significance of metaphase 1 (10 marks)
- b) Discuss the differences between DNA and RNA (5 marks)
- c) Describe polyploidy and its importance in crop plants (5 marks)
3. a) Discuss the relationship between DNA, gene, allele and chromosome (10 marks)
- b) Discuss monohybrid and dihybrid inheritance according to Mendelian Genetics (6 marks)
- c) State four (4) practical applications of genetics in modern life. (4 marks)
4. a) Describe the process of DNA replication, transcription and translation with reference to protein synthesis (10 marks)
- b) Draw the complementary strands of DNA and RNA for the portion of DNA shown below and state the process by which the above strands are obtained (5 marks)
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- c) Discuss the role of mutation in the development of cancer of tissues. (5 marks)
5. a) Outline the major differences between sexual and asexual reproduction and state the significance of the latter in crop production (10 marks)
- b) Outline a laboratory procedure used to investigate mitosis in plant tissue (10 marks)